

# MSF10N80

## 800V N-Channel MOSFET

### Description

The MSF10N80 is a N-channel enhancement-mode MOSFET , providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220F package is universally preferred for all commercial-industrial applications

### Features

- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge: 10.5 nC (Typ.)
- Extended Safe Operating Area

Lower RDS(ON) : 5.5 Ω (Typ.) @VGS=10V

- RoHS compliant package

### Application

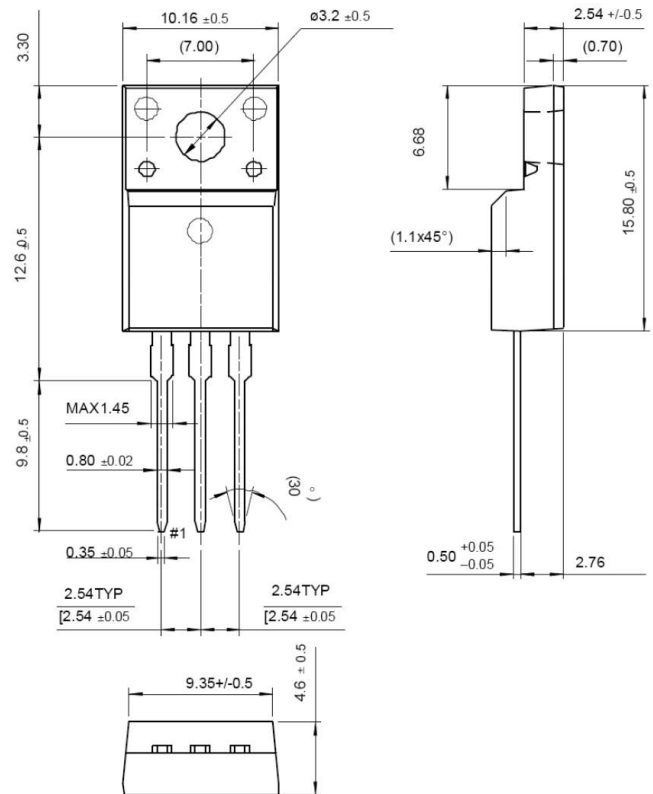
- Power Factor Correction
- LCD TV Power
- Full and Half Bridge Power

### Packing & Order Information

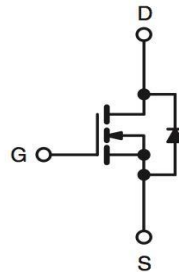
50/Tube ; 1,000/Box



**RoHS**  
COMPLIANT



### Graphic symbol



## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

### Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain-Source Voltage	800	V
V <sub>GS</sub>	Gate-Source Voltage	±30	V
I <sub>D</sub>	Drain Current -Continuous (TC=25°C)	10	A
	Drain Current -Continuous (TC=100°C)	6.5	A
I <sub>DM</sub>	Drain Current Pulsed	40	A
E <sub>AS</sub>	Single Pulsed Avalanche Energy	960	mJ
E <sub>AR</sub>	Repetitive Avalanche Energy	24	mJ

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### Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
dV/dt	Peak Diode Recovery dV/dt	4.0	V/ns
P <sub>D</sub>	Power Dissipation (TC = 25 °C)	60	W
	- Derate above 25°C	0.48	W/°C
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C

- Drain current limited by maximum junction temperature

### Thermal Resistance Characteristics

Symbol	Parameter	Max.	Units
R <sub>θJC</sub>	Junction-to-Case	0.52	°C/W
R <sub>θJA</sub>	Junction-to-Ambient	40	

### On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
V <sub>GS</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	3.0	--	5.0	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 5 A	--	0.9	1.1	Ω

### Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250μA	800	--	--	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 250μA, Referenced to 25°C	--	1.0	--	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 800 V, V <sub>GS</sub> = 0 V V <sub>DS</sub> = 640 V, T <sub>C</sub> = 125°C	--	--	10 100	μA
I <sub>GSSF</sub>	Gate-Body Leakage Current, Forward	V <sub>GS</sub> = 30 V, V <sub>DS</sub> = 0 V	--	--	100	nA
I <sub>GSSR</sub>	Gate-Body Leakage Current, Reverse	V <sub>GS</sub> = -30 V, V <sub>DS</sub> = 0 V	--	--	-100	nA

### Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, F = 1.0MHz	--	2200	--	pF
C <sub>OSS</sub>	Output Capacitance		--	190	--	pF
C <sub>RSS</sub>	Reverse Transfer Capacitance		--	20	--	pF

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### 800V N-Channel MOSFET

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Time	$V_{DS} = 400\text{ V}, I_D = 10\text{ A},$ $R_G = 25\ \Omega$	--	60	--	ns
$t_r$	Turn-On Time		--	150	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	110	--	ns
$t_f$	Turn-Off Fall Time		--	90	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 640\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}$	--	46	--	nC
$Q_{gs}$	Gate-Source Charge		--	15	--	nC
$Q_{gd}$	Gate-Drain Charge		--	20	--	nC

Source-Drain Diode Maximum Ratings and Characteristics						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$I_S$	Continuous Source-Drain Diode Forward Current		--	--	10	A
$I_{SM}$	Pulsed Source-Drain Diode Forward Current		--	--	40	
$V_{SD}$	Source-Drain Diode Forward Voltage	$I_S = 10\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.4	V
$t_{rr}$	Reverse Recovery Time	$I_S = 10\text{ A}, V_{GS} = 0\text{ V}$ $diF/dt = 100\text{ A}/\mu\text{s}$	--	730	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	12	--	$\mu\text{C}$

#### Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2.  $L=18\text{mH}, I_{AS}=10\text{A}, V_{DD}=5\text{V}, R_G=25\Omega,$  Starting  $T_J=25^\circ\text{C}$
3.  $I_{SD} \leq 10\text{A}, di/dt \leq 200\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS},$  Starting  $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width  $\leq 300\mu\text{s},$  Duty Cycle  $\leq 2\%$
5. Essentially Independent of Operating Temperature

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### ■ Characteristics Curve

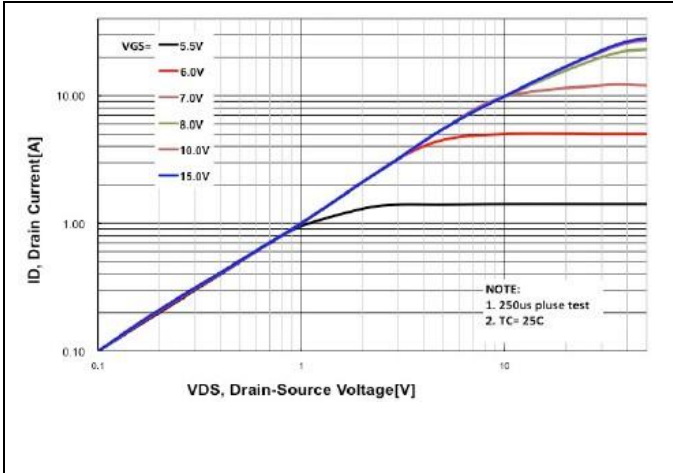


FIG.1-ON REGION CHARACTERISTICS

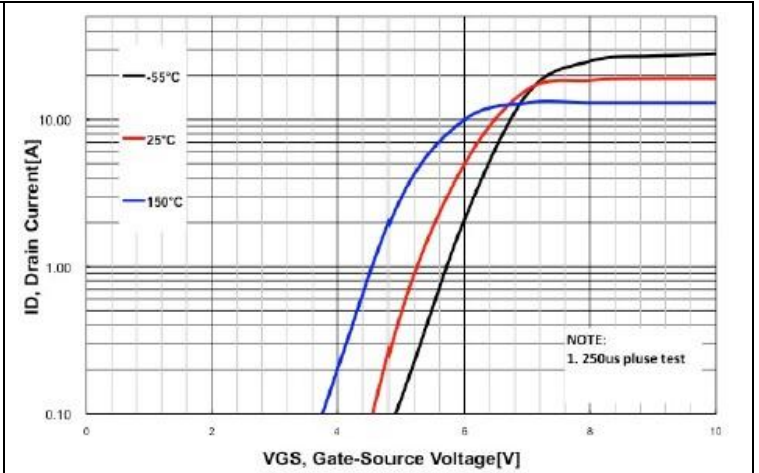


FIG.2-TRANSFER CHARACTERISTICS

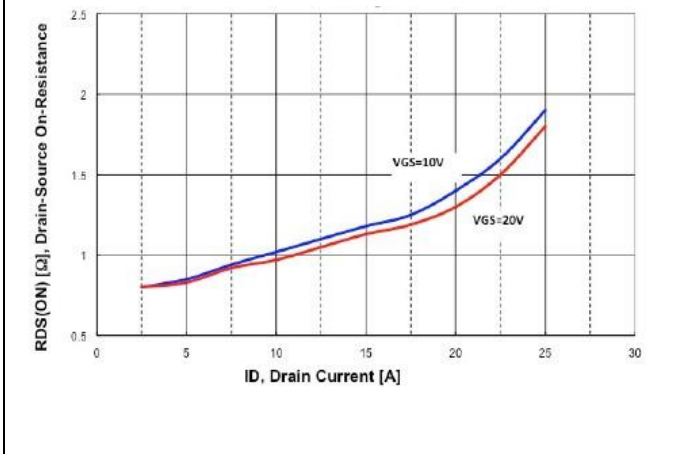


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

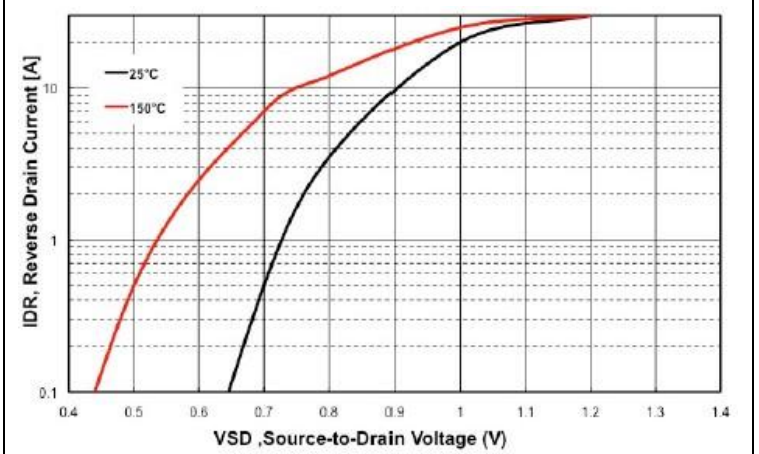


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

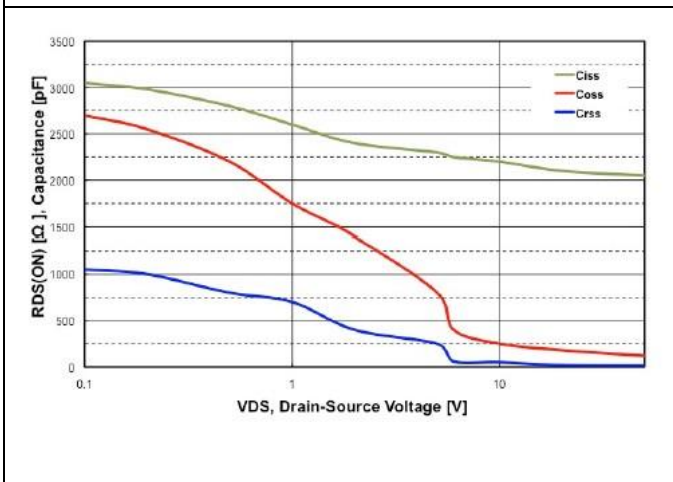


FIG.5-CAPACITANCE CHARACTERISTICS

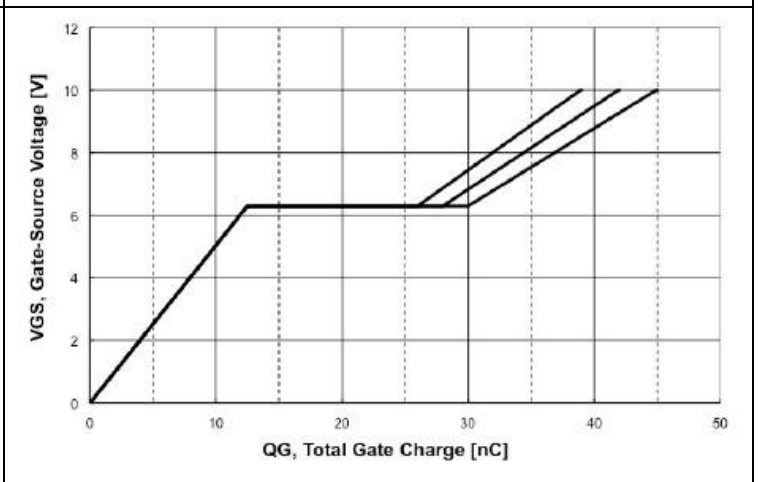
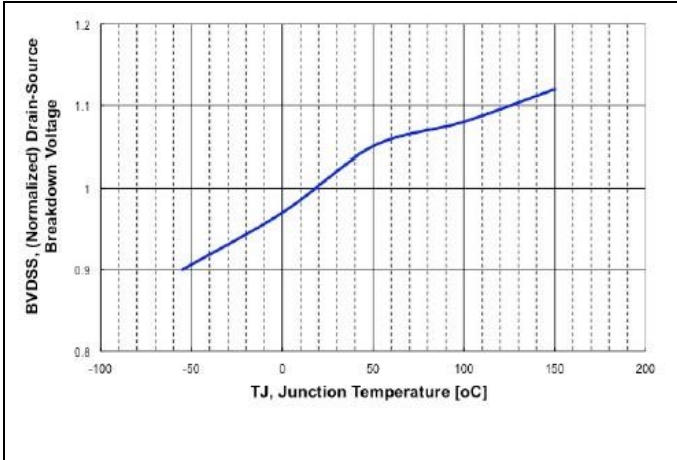


FIG.6-GATE CHARGE CHARACTERISTICS

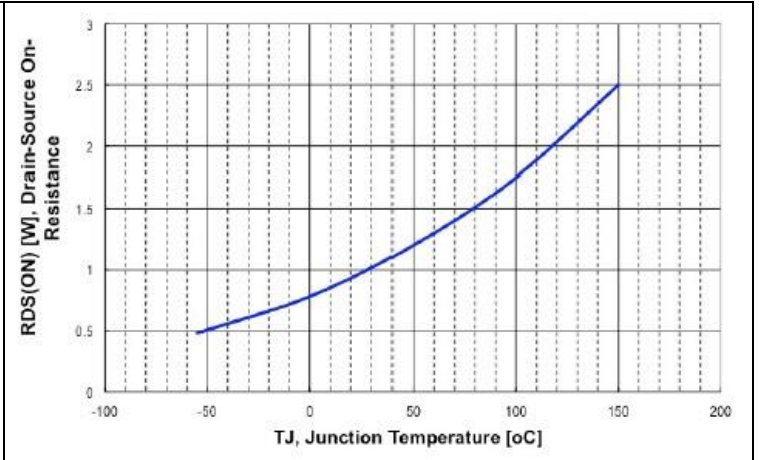
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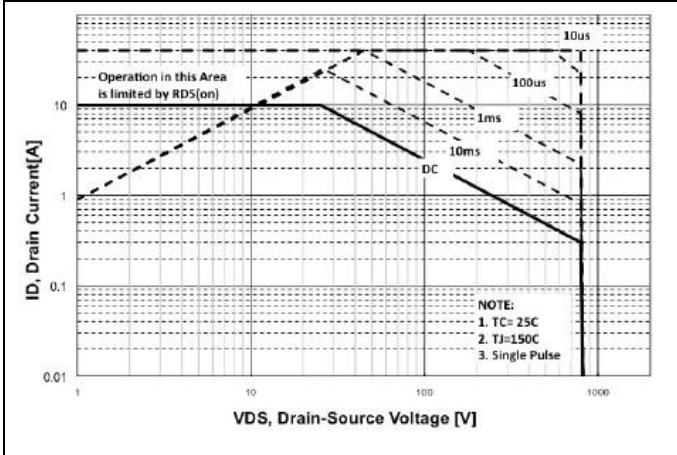
### ■ Characteristics Curve



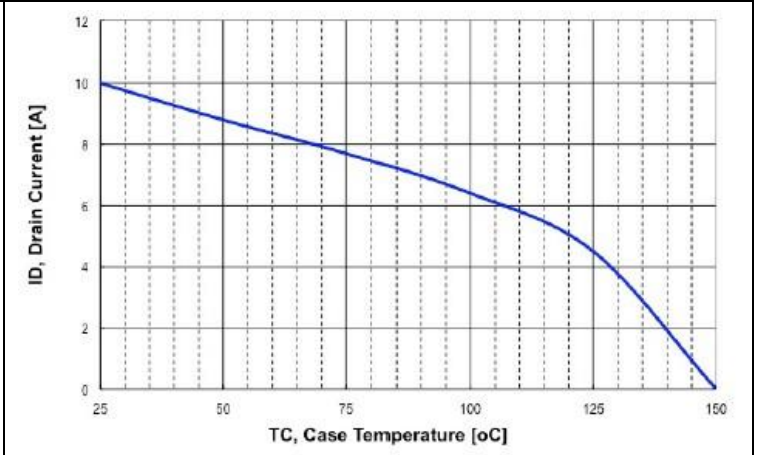
**FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE**



**FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE**



**FIG.9-MAXIMUM SAFE OPERATING AREA**



**FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE**



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■ Characteristics Test Circuit & Waveform

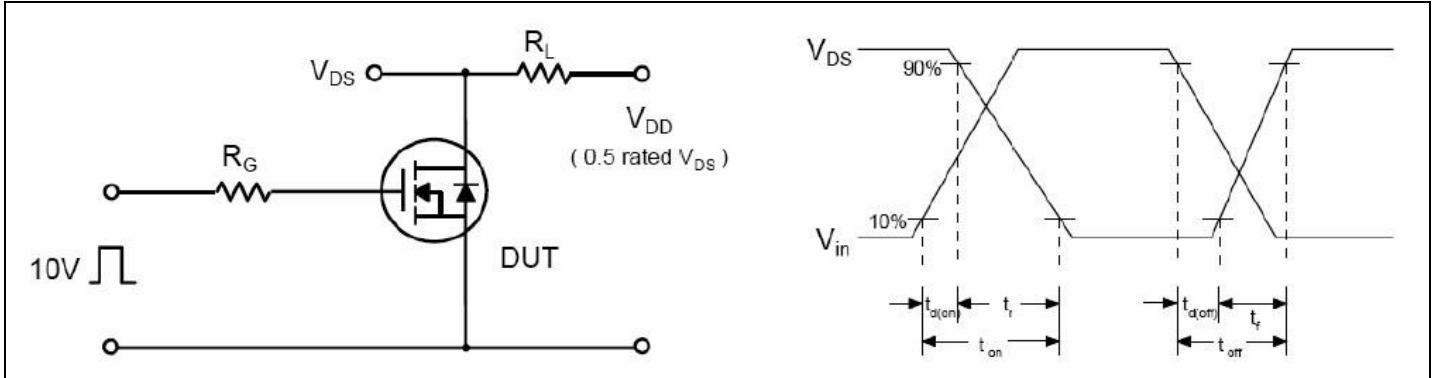


Fig 12. Resistive Switching Test Circuit & Waveforms

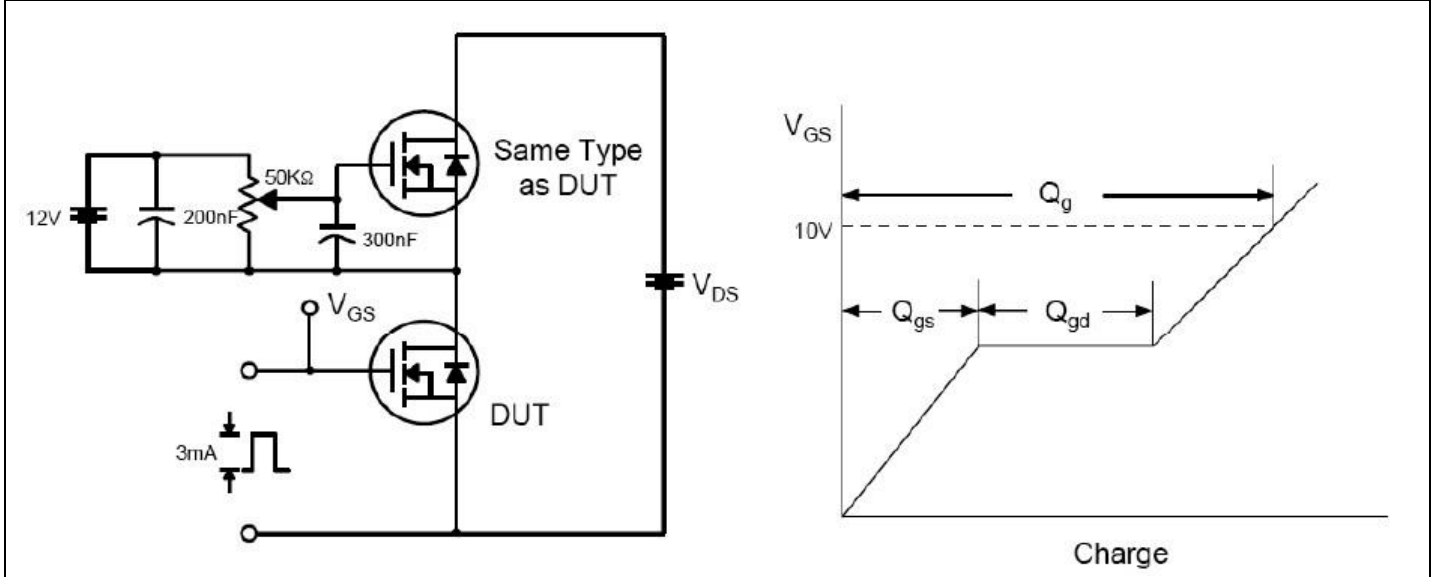


Fig 13. Gate Charge Test Circuit & Waveform

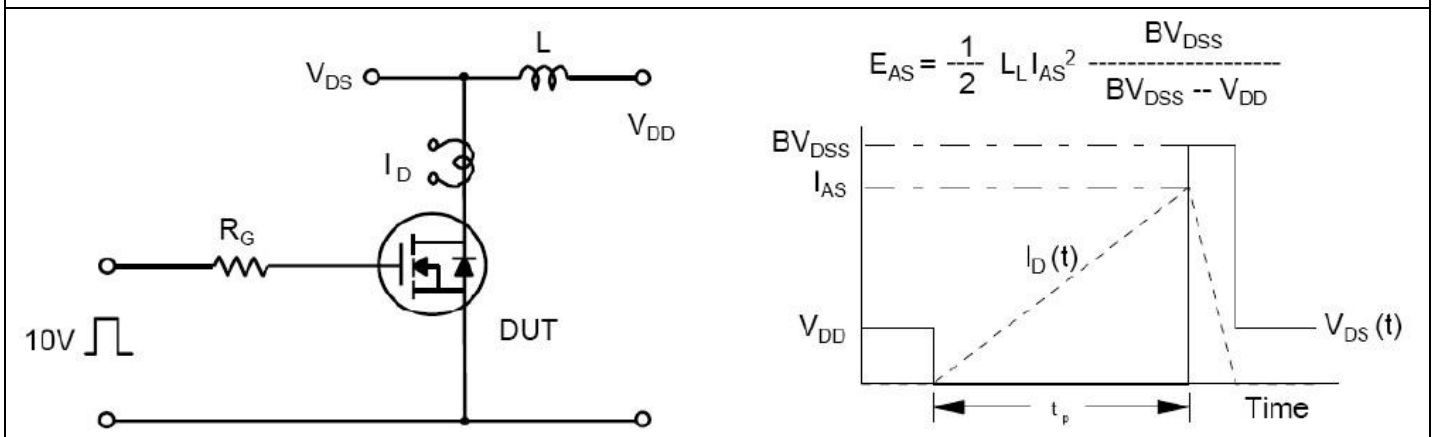


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

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### Disclaimer

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